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Naoto Kinjo

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EXAMINER

DASTOURI, MEHRDAD

ART UNIT

PAPER NUMBER

2623

DATE MAILED: 03/24/2004

6

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/630,315

Applicant(s)

KINJO, NAOTO

Examiner

Mehrdad Dastouri

Art Unit

2623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 07 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-40 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-40 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 5.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Response to Amendment***

1. Applicants' amendment filed January 7, 2004, has been entered and made of record.
2. Objection to the abstract of the disclosure is withdrawn in view of Applicants' amendment.
3. Applicants' arguments regarding Claims 2-26 have been fully considered but they are not persuasive.

With regards to Claims 2 and 9, and Claims 6 and 7, in response to Applicants' request for providing documentary evidence concerning parallel processing of specified image subject extracting algorithms, Examiner refers the Applicants to the teachings of Ohmi et al (U.S. 5,923,779). Ohmi et al disclose a face recognition method and corresponding apparatus wherein the extracting algorithms for extraction of face parts are performed in parallel as depicted in Figure 2. Additionally, this prior art disclose that the parallel processing is performed after precedent stages of implementing noise removal algorithm and edge detection algorithm. Considering the teachings of Saber et al and Ohmi et al, Claims 2-7 and 9-14 are not patentable over the cited prior arts.

Regarding Applicants' arguments concerning Claim 8, it is submitted that Claim 8 recites the device for implementing the methodology recited in Claim 1. The prior art of record (Saber et al) clearly disclose the device for performing the algorithms or methodology of its face recognition as indicated in Section 3 titled "results", and depicted in Figures 4 and 5. Consequently, analogous arguments presented for Claim

1 are also applicable to Claim 8. It is further emphasized that Applicants have not indicated any arguments concerning the limitations in original Claim 1. The change control unit and subject processing unit are inherent components of the device for performing methodology of Claim 1. As a result, Applicants' statement "the change control unit and the image subject extraction processing unit would be obvious in view of the prior art, would be merely a result of hindsight" is not relevant and is invalid.

Concerning Claim 15, Saber clearly discloses the broad limitation of performing a vote in an N-dimensional space of an image characteristic quantity. An image is a 2-dimensional space of the pixels representative of "pixel intensities" or "image characteristic quantity". The symmetry-based cost function disclosed teaches the vote in 2-dimensional space (spatial space) of the image. Claim language does not specify a plurality of extraction areas. Additionally, the alternate language of the claim requires only one "image subject extracting algorithm". Consequently, Saber's teachings concerning voting for the eyes (comprising,  $C_n^1$ ,  $C_n^2$ ,  $C_n^3$ ,  $C_n^4$  and  $C_n^5$ ) reads claim language. Furthermore, since the location of the tip of the nose and center of the mouth is dependent of the location of the eyes (which has been obtained based on the voting), it will be concluded that the voting has been performed for other extraction areas as well. Aggregation of votes has been clearly taught in Formula (10) wherein  $C_n$  is the combination of the individual votes. Nowhere in the Office Action, the distance of eyes from an axis is referred to as an aggregation of votes.

Regarding Applicants' arguments concerning Claim 16, as it was indicated in the response to Claim 15 arguments, Claim 16 broadly recites, "performing a vote in an N-

Art Unit: 2623

dimensional space of an image characteristic quantity". A reasonable interpretation of the claim language is associating the N-dimensional space to the image characteristic quantity. In this case, a response analogous to those presented for Claim 15 is applicable to Claim 16. Even if Applicants desire to associate the space to "vote" and implies a "voting space" (which is not properly recited in the claim and contradicts Claim 18 limitations), the symmetry-based cost function (voting function) is a five-dimension vector of  $C_n^1$ ,  $C_n^2$ ,  $C_n^3$ ,  $C_n^4$  and  $C_n^5$ , representative of a five-dimensional space.

Regarding Applicants' arguments concerning Claim 17, any of the cost functions, e.g.,  $C_n^1$ , may be considered a preferential frame.

Regarding Applicants' arguments concerning Claim 18, the image of the face is inherently a two-dimensional space of pixel values. Additionally, Section 2.1 describes a three-dimensional color space of the image characteristic quantity.

Regarding Applicants' arguments concerning Claim 19, finding the minimum of the cost function in the eye region on horizontal minor axis is the weighting value lowering processing (Page 657, Formula (8)).

Regarding Applicants' arguments concerning Claim 20, assigning lower values (sometimes even zero value) of weighting factors to the extracted data having large or small size in comparison to the mean value of the observed population of the data (outlier data), will remove a remarkably large size or a remarkably small size from extraction data. Applicants are definitely aware of this well known concept, and it appears that it is not necessary to refer the Applicants to the fundamentals of statistics.

Art Unit: 2623

Concerning Claims 21-26, responses analogous to those presented for Claims 15-20 are applicable to Claims 21-26.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 8, 27 and 40 are rejected under 35 U.S.C. 102(b) as being anticipated by Nguyen et al (Segmentation, Grouping and feature Detection for Face Analysis; IEEE Proceedings in Computer Vision, ISBN: 0-8186-7190-4).

Regarding Claim 1, Nguyen et al disclose a method of extracting a specified image subject which successively implements a plurality of specified image subject extracting algorithms, comprising the steps of:

implementing an extracting algorithm of a precedent stage under a predetermined extracting condition to obtain an extraction result (Figure 1, connected component labeling to create a silhouette and extracting a head image; Page 594, Section 2.2);

changing an extracting condition of a subsequent stage so as to be adapted to the thus obtained extraction result (Figure 1, skin segmentation and face-orientation; Page 594, Section 2.2); and

implementing an extracting algorithm of said subsequent stage under the thus changed extracting condition (Figures 3-6, Pages 596-598; first and second columns in Figure 3),

wherein said precedent stage comprises extracting a shape of specified image subject (Figure 2, extraction of silhouette and head image).

With regards to Claim 8, arguments analogous to those presented for the corresponding limitations of this claim in Claim 1 are applicable to Claim 8.

With regards to Claim 27, arguments analogous to those presented for the corresponding limitation of this claim in Claim 1 are applicable to Claim 27.

Regarding Claim 40, Nguyen et al further disclose a method of extracting a specified image subject according to Claim 1, wherein said subsequent stage comprises detecting a color or hue of the specified image subject (Section 1.3, Color-based segmentation, feature detection).

6. Claims 15-26, 38 and 39 are rejected under 35 U.S.C. 102(b) as being anticipated by Saber et al (Face Detection and Facial Feature Extraction Using Color, Shape and Symmetry-based Cost Functions; IEEE Proceedings on Pattern Recognition, ISBN: 1015-4651).

Regarding Claim 15, Saber et al disclose a method of extracting a specified image subject, comprising the steps of:

performing image subject extraction processing by a specified image subject extracting algorithm or algorithms for each extraction area (Figures 1-3; Pages 656-657,

Art Unit: 2623

Section 2, Sub-sections 2.1-2.4, skin/non-skin classification and shape classification algorithms);

performing a vote in an N-dimensional space of an image characteristic quantity for each extraction area extracted by said specified image subject extracting algorithm or algorithms (Figures 1-3; Pages 656-657, Section 2, Sub-section 2.5, cost function (5)); and

performing weighting of degree of certainty as a specified image subject based on an aggregation value of the vote within a section area for aggregation in said N-dimensional space (Figures 1-3; Pages 656-657, Section 2, Sub-section 2.5, cost function Formula (5), weighted combination of the cost function) Formula (10)).

Regarding Claim 16, Saber et al further disclose the method of extracting the specified image subject according to claim 15, wherein said image subject extraction processing by said specified image subject extracting algorithm or algorithms is performed through dividing it into a plurality of stages (Figures 1-3; Pages 656-657, Section 2, Sub-section 2.5, plurality of stages for eye, nose and mouth localization, and further plurality of stages based on cost functions  $C_n^1$ ,  $C_n^2$ ,  $C_n^3$  for eye detection); and

said image subject extraction processing in a subsequent stage is preferentially applied to an extraction area in which said aggregation value in the voting space of said image characteristic quantity exceeds a predetermined value (Figures 1-5; Pages 656-658, Section 2, Sub-section 2.5, Thresholds  $t_1$  and  $t_2$ ).

Regarding Claim 17, Saber et al further disclose the method of extracting the specified image subject according to Claim 15, wherein said specified image subject



Art Unit: 2623

extraction processing by said specified image subject extracting algorithm or algorithms is performed through dividing it into a plurality of stages (Figures 1-3; Pages 656-657, Section 2, Sub-section 2.5, plurality of stages for eye, nose and mouth localization); and said image subject extraction processing in a subsequent stage is preferentially applied to an extraction area corresponding to said section area for aggregation within a preferential frame in the voting space of said image characteristic quantity (Figures 1-5; Pages 656-657, Section 2, Sub-section 2.5).

Regarding Claim 18, Saber et al further disclose the method of extracting the specified image subject according to Claim 15, wherein a combination of a plurality of image characteristic quantities selected from the group consisting of a position, size, direction or orientation of an extraction area and, a posture, density or color tint of an image subject is used as the N-dimensional space of said image characteristic quantity. (Figures 1-5; Pages 656-657, Section 2, Sub-sections 2.1-2.5. Skin/non-skin classification and shape classification algorithms implement a plurality of image characteristic quantities consisting of position, size, direction or orientation of an extraction area (Face, Eye, Nose and Mouth) and, a posture, density or color tint of an image subject (Skin-non-skin color classification in YES color space).).

Regarding Claim 19, Saber et al further disclose the method of extracting the specified image subject according to Claim 15, wherein weighting value lowering processing is applied to a region within a predetermined area on a specific characteristic axis with respect to a neighborhood of the region, in which said aggregation value became large, in said N-dimensional characteristic stage (Figures 1-

Art Unit: 2623

5; Pages 656-657, Section 2, Sub-sections 2.4-2.5. Principal axes of the elliptical skin classified region in N-dimensional eigenspace. Eyes are located on a line which is parallel to the minor axis represented by the direction of the eigenvector corresponding to the smaller eigenvalues. Finding the minimum of the cost function in the eye region on horizontal minor axis is the weighting value lowering processing (Page 657, Formula (8)).

Regarding Claim 20, it is a conventional methodology in statistical decision processing to remove a remarkably large size or a remarkably small size from extraction data to increase the accuracy and reliability of extracting the subjects for recognition or classification purposes (Official Notice). Assigning lower values (sometimes even zero value) of weighting factors to the extracted data having large or small size in comparison to the mean value of the observed population of the data (outlier data), will remove a remarkably large size or a remarkably small size from extraction data.

With regards to Claim 21, arguments analogous to those presented for Claim 15 are applicable to Claim 21.

With regards to Claim 22, arguments analogous to those presented for Claim 16 are applicable to Claim 22.

With regards to Claim 23, arguments analogous to those presented for Claim 17 are applicable to Claim 23.

With regards to Claim 24, arguments analogous to those presented for Claim 18 are applicable to Claim 24.

With regards to Claim 25, arguments analogous to those presented for Claim 19 are applicable to Claim 25.

With regards to Claim 26, arguments analogous to those presented for Claim 20 are applicable to Claim 26.

Regarding claim 38, Saber further disclose a method of extracting a specified image subject according to Claim 15, wherein said vote comprises an aggregation of points indicative of the specified image subject (Section 2.5, centroids of the "holes" within the skin segmentation mask).

With regards to Claim 39, arguments analogous to those presented for Claim 38 are applicable to Claim 39.

***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 2-7, 9-14, and 32-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saber et al (Face Detection and Facial Feature Extraction Using Color, Shape and Symmetry-based Cost Functions; IEEE Proceedings on Pattern Recognition, ISBN: 1015-4651) in view of Ohmi et al (U.S. 5,923,779).

With regards to Claims 2 and 9, arguments analogous to those presented for Claim 1 are applicable to Claim 2 and 9. Saber et al disclose performing a plurality of

Art Unit: 2623

image subject extracting algorithm of the subsequent stage (Sub-section 2.5; Algorithms resulted in cost functions indicated by Formulas (5) through (9)).

Saber et al do not explicitly disclose the plurality of image subject extracting algorithm of the subsequent stage being performed by parallel processing.

Ohmi et al disclose a face recognition method and corresponding apparatus wherein the extracting algorithms for extraction of face parts are performed in parallel as depicted in Figure 2.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Saber et al invention according to the teachings of Ohmi et al to perform the plurality of image subject extracting algorithm of the subsequent stage by parallel processing because it is an extremely well known procedure routinely implemented in the art to expedite image processing.

Regarding Claim 3, Saber et al further disclose the method of extracting the specified image subject according to Claim 2, wherein said respective extraction processing conditions are areas to be subjected to extraction processing when implementing said plurality of specified image subject extracting algorithms of said subsequent stage (Figures 1-5, Face Areas).

Regarding Claim 4, Saber et al further disclose the method of extracting the specified image subject according to Claim 2, wherein said respective extraction processing conditions are types of extracting algorithms to be implemented at said subsequent stage (Figures 1-3, Pages 656-657, Sub-section 2.4, Shape classification algorithms for locating face, nose, mouth, etc.).

Regarding Claim 5, Saber et al further disclose the method of extracting the specified image subject according to Claim 2, wherein said respective extraction processing conditions are control parameters inside extracting algorithms to be implemented in said subsequent stage (Figures 2 and 3; Pages 656-657, Sub-sections 2.4 and 2.5,  $m_1$ ,  $m_2$ , eigenvalues of  $R$ ,  $(\lambda_1, \lambda_2)$ , etc.).

With regards to Claim 6, arguments analogous to those presented for Claim 2 concerning parallel processing are applicable to Claim 6.

Saber et al further disclose the method of extracting the specified image subject according to Claim 2, wherein said plurality of specified image subject extracting algorithms to be implemented in said each stage are of same combination in said plurality of stages (Sub-section 2.5. Algorithms resulted in cost functions are indicated by Formulas (5) through (10), utilizing the same combination of defining the centroids and location of the holes (eyes)).

With regards to Claim 7, arguments analogous to those presented for Claim 2 concerning parallel processing are applicable to Claim 7.

Saber et al further disclose the method of extracting the specified image subject according to Claim 2, wherein said plurality of specified image subject extracting algorithms to be implemented in said each stage are of different combination in said plurality of stages (Sub-section 2.5. Algorithms resulted in localization of the nose and mouth as depicted in Figure 3.).

With regards to Claim 10, arguments analogous to those presented for Claim 3 are applicable to Claim 10.

With regards to Claim 11, arguments analogous to those presented for Claim 4 are applicable to Claim 11.

With regards to Claim 12, arguments analogous to those presented for Claim 5 are applicable to Claim 12.

With regards to Claim 13, arguments analogous to those presented for Claim 6 are applicable to Claim 13.

With regards to Claim 14, arguments analogous to those presented for Claim 7 are applicable to Claim 14.

With regards to Claims 32 and 33, arguments analogous to those presented for Claims 2 and 9 corresponding to the teachings of Ohmi et al concerning parallel processing are applicable to Claims 32 and 33.

With regards to Claims 34 and 35, combined teachings of Saber et al and Ohmi et al disclose the image subject extraction parallel processing comprises:

Skin color extraction, face contour extraction, hair-on-head extraction, eye/nose/mouth/eyebrow extraction, body extraction (head box in Figure 2 of Ohmi et al), and non-background area extraction (Figures 4b and 5b of Saber et al).

9. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nguyen et al (Segmentation, Grouping and feature Detection for Face Analysis; IEEE Proceedings in Computer Vision, ISBN: 0-8186-7190-4) in view of Hasegawa et al (Real-time Parallel and Cooperative Recognition of Facial Images for an Interactive Visual Human Interface; IEEE Paper ISBN: 1051-4651).

Regarding Claim 28, Nguyen et al do not explicitly disclose a method of extracting a specified image subject according to Claim 1, wherein said predetermined extracting condition comprises electronic flash or backlight information.

Hasegawa et al disclose a real-time face recognition system comprising extraction condition regarding backlight (Page 386, Section 5.1.1, day time and evening lighting conditions).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Nguyen et al invention according to the teachings of Hasegawa et al to consider electronic flash or backlight information as one of the feature extraction parameters because it will compensate for environmental or ambient brightness changes and will provide more accurate recognition results.

With regards to Claim 29, arguments analogous to those presented for Claim 28 are applicable to Claim 29.

10. Claims 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saber et al (Face Detection and Facial Feature Extraction Using Color, Shape and Symmetry-based Cost Functions; IEEE Proceedings on Pattern Recognition, ISBN: 1015-4651) in view of Ohmi et al (U.S. 5,923,779) and Hasegawa et al (Real-time Parallel and Cooperative Recognition of Facial Images for an Interactive Visual Human Interface; IEEE Paper ISBN: 1051-4651).

With regards to Claims 30 and 31, arguments analogous to those presented for Claim 28 are applicable to Claims 30 and 31.

Art Unit: 2623

11. Claims 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saber et al (Face Detection and Facial Feature Extraction Using Color, Shape and Symmetry-based Cost Functions; IEEE Proceedings on Pattern Recognition, ISBN: 1015-4651) further in view of Ohmi et al (U.S. 5,923,779) and Wurtz (Object Reconstruction Robust Under Transitions, Deformations, and Changes in Background", IEEE Transactions on Pattern Analysis and Machine Intelligence, ISBN: 0162-8828).

Saber et al and Ohmi et al do not explicitly disclose the method of extracting a specified image subject wherein the extraction algorithms comprise different degrees of resolution.

Wurtz discloses a face recognition comprising extraction algorithms at different degrees of resolution (Sections 2.1 and 2.2).

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Saber et al and Ohmi et al combination according to the teachings of Wurtz to utilize extraction algorithms at different degrees of resolution because it will discard low level features due to a variation in background (Wurtz; Abstract and Section 2.4).

### ***Conclusion***

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).



Art Unit: 2623

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Contact Information***

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mehrdad Dastouri whose telephone number is (703) 305-2438. The examiner can normally be reached on Monday to Friday from 8:00 a.m. to 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

Art Unit: 2623

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mehrdad Dastouri  
Primary Examiner  
Group Art Unit 2623  
March 18, 2004

MEHRDAD DASTOURI  
PRIMARY EXAMINER

A handwritten signature in cursive script that reads "Mehrdad Dastouri".